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# American Cinematographer

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## This Month

**A Mid-Year Cinematographic Review — By Daniel B. Clark, A. S. C.**

**Trick Photography Methods Summarized — By Carl Gregory**

**Effect of Desensitizers in Development — By M. L. Dundon and J. I. Crabtree**

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Vol. VII JUNE, 1926 No. 3

# American Cinematographer

FOSTER GOSS, *Editor and General Manager*
C. K. PHILLIPS, *Special Representative*

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An educational and instructive publication, espousing progress and art in motion picture photography.
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*(Copyright, 1926, by the American Society of Cinematographers, Inc.)*

*Hans Koenekamp, A. S. C., is chief cinematographer on First National's "Delicatessen," starring Colleen Moore. On a Saturday night, Hans finished filming "Spuds," starring Larry Semon, and on Monday morning began on the Moore feature.*

* * *

George Schneiderman, A. S. C., will photograph "The Devil's Master," a Fox feature, to be directed by John Ford and to star George O'Brien. It is a modern sea story, with the events of the period of 1917 as the background.

* * *

*William Marshall, A. S. C., is photographing Paramount's "Be Yourself," starring Raymond Griffith. This is the second Griffith feature that Marshall has filmed since he re-joined the Paramount fold.*

* * *

Charles G. Clarke, A. S. C., is filming "Red" Grange's debut in motion pictures. Sam Wood is directing. The story was written under the title of "The Halfback" by Byron Morgan, in whose romantic Saturday Evening Post thrillers Wallace Reid starred in the old Paramount days. Work is being done at the F. B. O. studios.

* * *

*Reginald Lyons, A. S. C., has completed the shooting of the Fox feature, "The Family Upstairs" which, directed by Jack Blystone, features Virginia Valli.*

* * *

Philip H. Whitman, A. S. C., has been made one of the writers on Mack Sennett's story council. In his early career as a cinematographer, Whitman was identified for several years with the Sennett camera staff.

*Dan Clark, A. S. C., has completed filming "No Man's Gold," starring Tom Mix for Fox. Lewis Seiler directed.*

* * *

Ira H. Morgan, A. S. C., is shooting Metro-Goldwyn-Mayer's "Tell Is to the Marines," which George Hill is directing. Lon Chaney and William Haines are included in the cast. Much of the action will be taken with the fleet off San Diego. Other nautical scenes will be made at San Pedro, where a Filipino and two Chinese sets have been erected.

* * *

*Gilbert Warrenton, A. S. C., is photographing the Universal production, "Butterflies in the Rain." Edward Sloman is directing.*

* * *

E. B. Du Par, A. S. C., on the completion of shooting Warner Brothers' "The Better 'Ole," went to New York City where he is doing special work on the Warners' invention, the "Cinephone." He is conferring on the apparatus with the Bell Telephone Company, the General Electric Company and the Edison organization. It will be Du Par's duty to work out a new system of lighting to take care of the device which is so sensitive, it is said, that it picks up the sounds of the flickering of an arc light.

* * *

*Herford Tynes Cowling, A. S. C., according to word received from the East as "In Camerafornia" goes to press, has been elected a full active member of the Explorers Club, New York City.*

* * *

*Faxon Dean, A. S. C., has finished photographing the Columbia production, "False Alarms," a fire picture, starring Dorothy Revier. Frank O'Connor directed.*

# The EDITOR'S LENS . . focused by FOSTER GOSS

## Past Twelve Months

IN another part of this issue, Daniel B. Clark, president of the American Society of Cinematographers, well points out, in a special article written for the "Directors' Number" of the *Film Daily*, that among the most notable developments during the past twelve months in the field of cinematography has been the perfection of the small, portable "amateur" type of motion picture camera.

¶ The potency of this handy variety of cinema instrument is driven home with the announcement that it was part of the equipment of both the Byrd and the Amundsen polar expeditions. Nor were they deadweight luggage for they were used to make pictures of the North Pole territory.

¶ The result is that some three weeks after Byrd's dash to the pole, pictures of the event were being exhibited in the United States. It took five months for the world to learn that Peary even discovered the pole in 1909. How would posterity be enriched if Peary had carried such a convenient camera with him and made motion pictures of his arduous trip on foot over the treacherous and icy wastes!

¶ While the world at large hails Byrd, Amundsen, Ellsworth and their colleagues, let the film industry sing the praises of the engineers and mechanics who developed the compact type of camera that was the first to take moving pictures of the North Pole.

## New Projection Era

IN this month's projection department, conducted by Earl J. Denison, there appear the intelligent observations of a student of his profession in the article written by Arthur Gray, of the Lancaster Theatre, Boston, Mass.

¶ The projectionist must keep up with his calling or it will leave him behind. The greater the efforts of the projectionist to improve projection, the greater will be the strivings of the projector manufacturers to make such efforts mean the most, and the industry as well as the individual will benefit.

## A Little Problem

MANY are the problems to be threshed out in the convention of the exhibitors that is to be held in Los Angeles during the first week of the month; it therefore may be timely to note that one of the most glaring problems that faces cinematographers as a whole may be eradicated by the exhibitors merely as a matter of courtesy.

¶ If the exhibitors will see to it that the credit titles on motion pictures are not cut, directors, cinematographers and others will not have to continue to bear the humiliation of having their names eliminated from films in which producers have seen fit to credit them.

¶ It is a small favor to ask but cinematographers ask it.

## Virginians

SPEAKING of Byrd reminds one that he is a Virginian, and that Virginia still produces those intrepid figures whose romantic exploits startle the world. From the time of Finley and Boone, who were the first to penetrate the "dark and bloody" ground that lay in the unknown beyond the Blue Ridge, Virginia has been the mother of explorers as well as of Presidents.

¶ Which brings us, cinematographically, to Herford Tynes Cowling, who, a member of the American Society of Cinematographers, is proud to proclaim Suffolk in old Virginia as his home.

¶ Cowling has maintained the traditions of his sovereign state in taking his camera into the fastnesses of Africa, India and the Orient and bringing back records of regions where the white man had never trodden before. Unheralded, relatively, have the A. S. C. member's efforts been, but even so were those of George Rogers Clark who added considerably to the territory of Virginia in his day.

# Amateur Cinematography

## "Amateur" Camera is Carried to North Pole

¶ *Byrd and Amundsen Expeditions Take Bell and Howell Product over Pole; Motion Picture Records Made with Instrument.*

Another triumph for the "amateur" model of motion picture camera was scored when the "Eyemo" was carried to and over the North Pole by the expeditions headed respectively by Lt. Commander Richard Byrd and by Raold Amundsen on the dirigible, "Norge."

*Historical*

Newspapers throughout the country carried dispatches of motion pictures being taken of the North Pole on the occasion of the second time it was ever visited by a human being. The event is regarded as one of the most historical in the annals of the manufacture of motion picture equipment.

Similarly, the filming of the eruption of the Mauna Loa was done through the medium of the "Eyemo" which, it is stated, rendered possible International Newsreel's "scoop" on this happening.

*Expeditions*

The "Eyemo" type of camera has been widely adopted for use in various expeditions, including the Third Asiatic Expedition, the Bering Sea Expedition, the Speejax Expedition, the Smithsonian-Chrysler Expedition to Africa, the Wilkins North Pole Expedition; and the African and Mongolian Expedition of the American Museum of Natural History.

**New Tripod Head**

## Tripod Head for Small Camera

¶ *Fred Hoefner, of Hollywood, Perfects and Markets Device Especially Adapted to Amateur Motion Picture and Still Cameras; Larger Model for Professional Cameras to Be Forthcoming.*

A new tripod head, adapted for the use of small amateur motion picture and still cameras, is announced in Hollywood by Fred Hoefner, precision mechanic, who is manufacturing the product under the patents of William Maulsby Thomas.

*Wide Range*

Hoefner's creation is called the "True-ball Tripod Head." It is rotated on a true ball, and after being set up level can be tilted in a 90 degree arc and can be rotated 360 degrees.

The device allows the camera to follow any object, at the same time remaining level.

*Larger Model*

It is said that this small model is to be supplemented by a larger one for professional size motion picture cameras. The professional model will have an independent tilt and pan.

# Cinematographer as Economy Unit in Production

Responsible Camera Artist Saves Salary *in* Course *of* One Picture

Great Economies Effected *through* Progress *and* Efficiency *of* Camera Calling

*(The following interview with Daniel B. Clark, president of the American Society of Cinematographers, was written by the editor of this publication for the studio section of the* EXHIBITORS HERALD:)

The cinematographer is in a keystone post in the matter of effecting economy in cost of motion picture production, according to Daniel B. Clark, president of the American Society of Cinematographers.

### *Saves Salary*

"The cinematographer," Clark states, "ordinarily saves his salary many times during the course of the average production. This may appear to be a novel assertion; nevertheless, it is true.

### *Great Economy*

"In the matter of illumination alone, careful regulation by him as to how much light is used on each set, thereby employing only the light actually needed and avoiding over-illumination, is a means of saving hundreds of dollars on a feature production.

### *Promptitude*

"The company," Clark continued, "rarely has to wait for the cinematographer to be ready to shoot. He is 'set up,' with all his lights arranged in proper positions, and waiting for the call, 'Camera,' when the director and the company are ready for action. If it were otherwise, it would mean, especially on sets with a great many extra people, the piling up of heavy overhead, due to the loss of time—for, need it be said that nothing can be done until the camera is ready to photograph? The cinematographer's alacrity in such matters is the result of the maximum efficiency to which he has reduced his work. Certainly a complete mastery of his subject is required for him, in the hurry and bustle of the set, to give commands as to where this light or that light is to be placed, all of which must be done in a few moment's time. What would have been the case if, in the beginning of the business, the procedure would have been established that a couple of hours or more would have been necessary for experimenting with and checking each array of lights, to determine its correctness?

### *Production Cost Cut*

"And so it is in the run of cinematographic improvements generally. The cinematographer has been quick to bring about or encourage such improvements, so that little corners, however imperceptible, are continually being cut in production costs. A faster or a more adaptable lens is immediately adopted, a new effect in miniature is worked out and so on—and hundreds of dollars and, in some instances, even thousands of dollars are saved for the producer. Thus, the expertness of the cinematographer brought the glass shot from the realm of probability to the plane of fact—and what producer doesn't realize the savings effected by this form of economy.

"These," the A. S. C. president concluded, "are but a few of the innumerable cases of cinematographic economies. Some rarely if ever come to executive attention, while others, because of their magnitude, command respect—as, for instance, the case in which one member of the A. S. C., is saving, it is reported, his company the sum of $40,000 by having eliminated, in a big production now being made, the necessity of countless night shots—and previously it had been thought that the nights of photographing were an indispensible evil in the making of this particular picture."

# PROJECTION • Conducted by Earl J. Denison

## Projection—Yesterday, Today and Tomorrow

By Arthur H. Gray
*Lancaster Theatre, Boston, Mass.*

Calling *of* Projectionist *In* Future *to* Bring Enlarged Scope *for* Expert

*(As editor of this department I have been thinking for some time that it would be a good idea to present a series of articles on projection by a number of the foremost projectionists.*

*In the past, too little has been heard from the projectionist himself, and it was my thought that it would be very interesting and constructive information if I could secure a number of articles from the right men.*

*To start the ball rolling I asked my good friend Arthur Gray of Lancaster Theatre, Boston, Mass., to write me an article on projection. I am very proud to present Mr. Gray's article entitled "Projection—Yesterday, Today and Tomorrow." Mr. Gray brings out some very pertinent points in this article and I think it is excellent reading matter. The article speaks for itself.*

*The Editor of the AMERICAN CINEMATOGRAPHER, as well as this writer, extends to all projectionists an invitation to write an article on projection for publication in this department, as we believe that offering discussion on projection and of projection problems, will be of immense value to everyone connected with the motion picture industry.—EARL J. DENISON.)*

---

A present day survey of the art of motion picture projection in the field of theatre presentation provides plenty of evidence that the art is now gradually being accorded the recognition which it rightfully deserves in the general scheme of things in the film industry. It is true that the evolution has been painfully slow and snail-like, and to those employed in the craft who have had its interest at heart there have come, during the past decade, many disquieting and discouraging moments in which the thought uppermost in mind was whether or not the game they had selected to play as a means of livelihood was worth the candle.

### *Indifference*

Frankly, the writer has never been able to understand just why the industry as a whole has, for so long a period of time, maintained such an apparent indifference to the development of an art which bears a most important and vital relation to the welfare of everyone connected with a production, from its conception to its final projection.

### *Secondary Importance*

The old saw, that, "a chain is no stronger than its weakest link," seems a particularly appropriate simile to this case. The thing is so perfectly obvious and has been clearly presented so many times that any further reiteration seems needless. It is a matter of common knowledge to those who have interested themselves in the situation that projection with the exception of a relatively few cases has consistently been accorded a position of secondary importance in the presentation of a picture. Happily, this condition is slowly but surely undergoing a process of change and it is quite within the realms of probability that the future standard of projection will be quite beyond the capabilities of the general average of projectionists now engaged in the work.

### *First Requisites*

Projection, in its origin, was suddenly launched forth as a new art without any existing similar field of endeavor from which to draw trained workers. Just what constituted projection and the qualifications of the "operator" was a matter for conjecture. The apparent requisite qualifications of the early motion picture operators were a certain amount of mechanical skill, a sketchy grounding in electrical knowledge and a disposition and temperament which defies description. The latter must be a heritage, inasmuch as the projectionist's penchant for peculiar craft traits and idiosyncrasies is quite definitely established even at this late date.

### *Formative Stages*

Of course, in the beginning, conditions were in a general chaotic condition as they invariably are during the formative stages of any great industry, but, nevertheless, projection has progressed much more slowly than any of the other allied arts until within a comparatively very recent period. Now, projection is beginning to come into its own and the demand for real skill in the projection room is making itself felt.

### *Inherent Talent*

The qualifications for an expert projectionist, as the art is being practiced today, is a peculiar and not too common combination of

(Continued on Page 22)

# "Trick" Photography Methods Summarized

Outstanding Methods Summed Up *with* Comment *on* History *and* Development

**By Carl Louis Gregory**
*F. R. P. S.;*
*Dean, N. Y. Institute of Photography*

Paper Presented *Before* Society *of* Motion Picture Engineers *in* Washington

## "Trick" Photography Experts

*Among the members of the A. S. C. who rate as experts in the realm of "trick" photography are Philip H. Whitman, Fred W. Jackman, Homer Scott and Paul P. Perry. Jackman and Scott were the masters of the intricate material in "The Lost World." Whitman was the wizard in "The Thief of Bagdad," working in conjunction with Arthur Edeson and Kenneth MacLean, both A. S. C. members. MacLean did similar work on Warner Brothers' "The Sea Beast." Perry is the cinematographic expert of the miniature department at Universal City.*

PAUL PERRY, A. S. C.

PHILIP H. WHITMAN, A. S. C.

FRED W. JACKMAN, A. S. C.

HOMER SCOTT, A. S. C.

The movies, our perennially infant industry, is no longer so infantile. Many of its first pewlings have already been engulfed in the oblivion of forgotten things. Trick photography was much employed in the production of the first French films. These were extensively "duped" in this country to feed the maw of the first nickelodeons and store shows that have almost passed from memory. The first efforts of the various producers allied under the banner of the Patents Company made many similar films, some of which attained considerable popularity. "Dreams of a Welch Rarebit Fiend," "A Trip to Mars," "Alice in Wonderland," "Princess Nicotine," "The Yarn of the Nancy Bell," "The Absent Minded Professor," and "The Star of Bethlehem," are names of some of these old trick films made in America that may recall ancient history in the minds of some of the older readers.

All of the productions named except the "Star of Bethlehem" were frankly trick pictures in which fantastic scenes contrary to the laws of nature were shown to obtain humorous and mystifying effects. "Dreams of a Welch Rarebit Fiend" was directed and photographed by Ed Porter; "Princess Nicotine" by Albert E. Smith, and the others were photographed by the writer for the Edison and Thanhouser Companies, so that I feel qualified to refer to the dim but not so distant past.

### *Early Tricks*

Unlike the frankly fantastic subjects, "The Star of Bethlehem" was the "Ben Hur" of its day when a thousand dollars spent on a production was more of an event than a million is at present. It was a conception of the birth of the Christ Child and although its scenes were laid in Palestine and Egypt the story was produced entirely in New York City and New Rochelle with only a few interiors set up in an old skating rink.

### *Varied Locale*

The Wise Men of the East tended their flocks of sheep on the lawn in Central Park and a piece of black cardboard masked out the tall buildings on 59th Street in the background and the Star of Bethlehem was later double exposed into the masked out sky by means of a

(Continued on Page 16)

# Effect of Desensitizers in Development

Part Two *of* Investigations *on* Photographic Developers Is Released

By M. L. Dundon and J. I. Crabtree
*Of the Eastman Research Laboratory.*

Paper Was Read *at* Spring Meeting *of* Society *of* Motion Picture Engineers

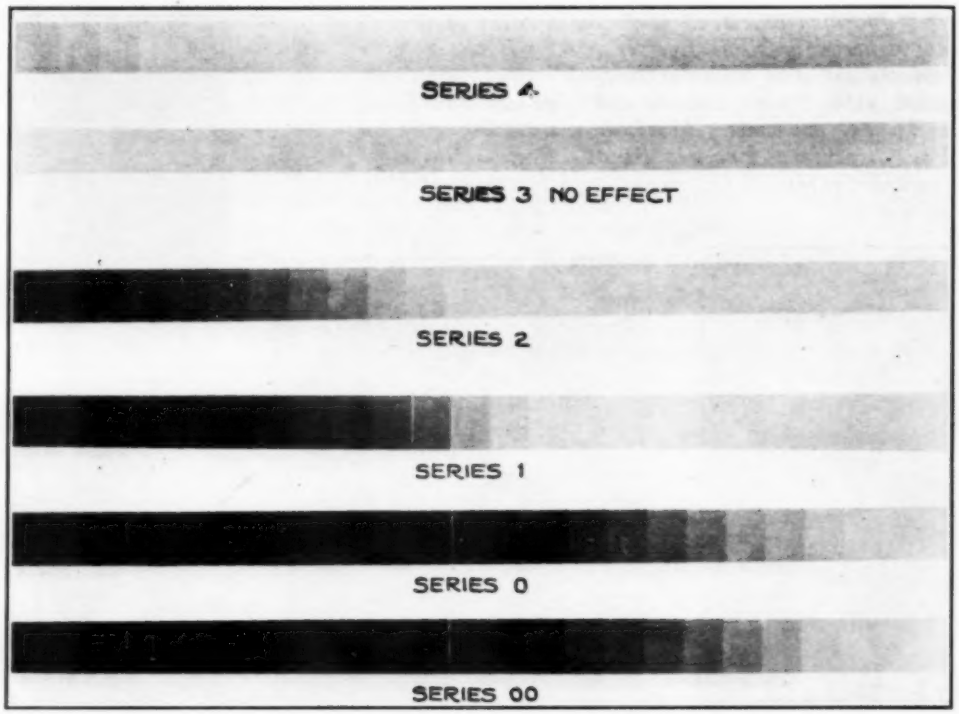



*Figure Two—Relative photographic effect of Wratten safelights on Panchromatic film.*

## I. Introduction.

The inspection of film during development is often desirable even though the time and temperature method can be used to produce negatives of a definite development contrast or gamma. Especially in the case of motion picture film, where only one positive material is used for printing all scenes, the production of negatives of fixed density contrast is desirable. In order to obtain this result the time of development must be varied according to the contrast of the original subject. Also, in ordinary photography, freedom of inspection during development may be of great assistance in obtaining the particular results desired.

## II. Methods of Securing Visibility During Development.

The greatest possible visibility during development may be obtained by using an efficient safelight and by desensitizing the film.

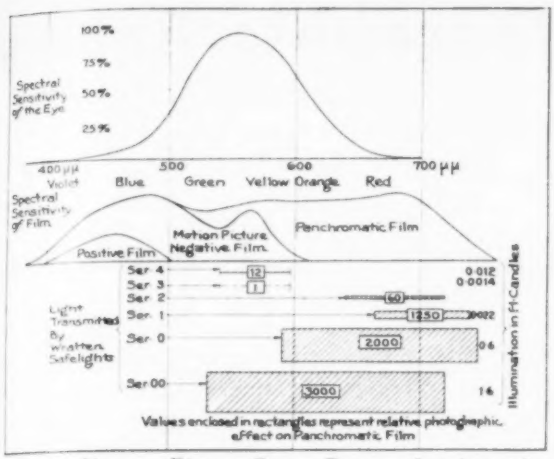
### *1. Suitable Choice of Safelight.*

In selecting an efficient safelight there are two factors to consider, (a) the sensitivity of the eye to light of different colors and wavelength, and (b) the color sensitiveness of the emulsion used. Mees and Baker[1] have explained this matter clearly and defined safelight efficiency as the product of the vsiual intensity of the light transmitted multiplied by its safety for a given emulsion. The relation of these factors is represented graphically in Fig. I where curves showing the special sensitivity of the eye and the special sensitivity of typical photographic emulsions are plotted on the same scale of wavelengths as the transmission of the Wratten safelights. From the upper curve[2] showing the spectral sensitivity of the eye it is evident that of a given intensity of radiation, the human eye is much more sensitive to green or yellow than to red or blue light. In fact the average point of maximum visibility for a large number of observers was at 560 mm.

Ordinary photographic emulsions, on the other hand, are sensitive only to the blue and violet, but when made orthochromatic they are sensitive also to green, and when panchromatic the sensitivity includes the red and is ex-

1. C. E. K. Mees and J. K. Baker, "A Measurement of the Efficiency of Dark Room Filters," Phot. Jour. **47**, 267, (1907).

2. K. S. Gibson and E. P. T. Tyndall, "Visibility of Radiant Energy," Sci. Paper, Bur. Standards, No. 475.




*Above: Figure One. Curves showing relation between visual and photographic intensity of light transmitted by Wratten safelights.*

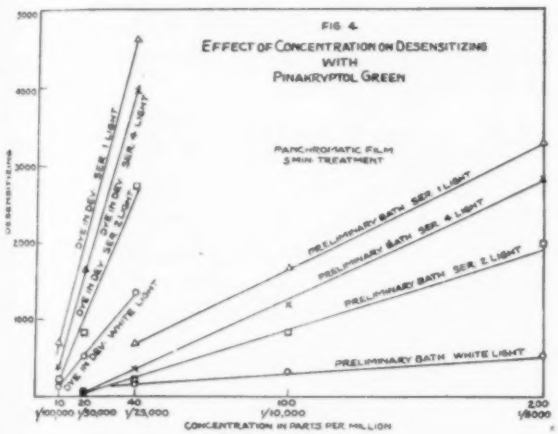


FIG 4.
EFFECT OF CONCENTRATION ON DESENSITIZING WITH PINAKRYPTOL GREEN
PANCHROMATIC FILM 5 MIN. TREATMENT
DYE IN DEV. SER. 1 LIGHT
DYE IN DEV. SER. 4 LIGHT
DYE IN DEV. SER. 2 LIGHT
DYE IN DEV. WHITE LIGHT
PRELIMINARY BATH SER. 1 LIGHT
PRELIMINARY BATH SER. 4 LIGHT
PRELIMINARY BATH SER. 2 LIGHT
PRELIMINARY BATH WHITE LIGHT
DESENSITIZING
CONCENTRATION IN PARTS PER MILLION

*Figure Four*

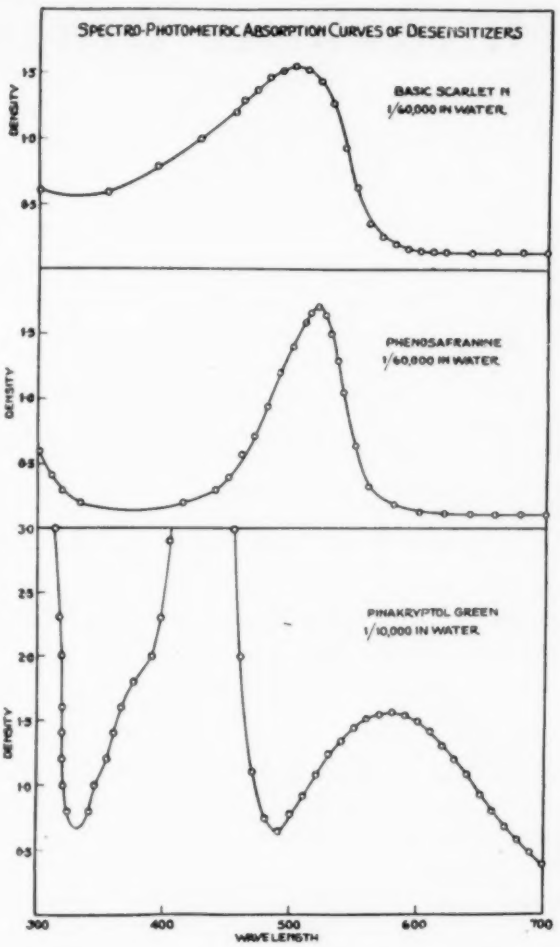



*Figure Three*

tended throughout the visible spectrum. The light transmitted by the Wratten Safelight Filters is represented in this diagram by blocks of which the extent of the base line corresponds to the wavelengths transmitted. The area, and the accompanying number, represent the relative photographic effectiveness of the light. This was measured by the effect produced on a panchromatic film when exposed to the different safelights for the same time through a step tablet (See Fig. 2). On the right are given the values in foot candles for the illumination given by the safelights and measured at a distance of 1 foot (30 cm.) when used in a Wratten safelight lamp containing a 25 W. bulb. The measurements were made with a Macbeth illuminometer. From this diagram it is evident that the yellowish green safelight, Series 3, is the most efficient for panchromatic materials, while for emulsions which are not red sensitive the red safelights Series 1 or 2 are better because of the relative insensitivity of the film to the light which they transmit. The extent to which these relations are modified by the use of desensitizers in development will be indicated later.

In Fig. 2 is shown the method by which the relative photographic effect of the light transmitted by the different safelights was measured. A step tablet having a density range of 3.4 was placed over a sheet of Commercial Panchromatic Film. Narrow strips were then exposed to each of the different safelights for the same time and in the same manner, and the whole sheet developed. From the densities of the step tablet corresponding in each case to the first visible image, the relative exposures were calculated.

The limits of safety in exposing Eastman Motion Picture Negative and Commercial Panchromatic Film to the various safelights is shown in Table I. The fog density produced with normal development by a ten seconds exposure to the safelight at a distance of one foot is given except where no effect was obtained in this time. In such cases the time required to produce a visible fog is recorded.

TABLE I

COMPARATIVE SAFETY OF UNTREATED FILM TO WRATTEN SAFELIGHTS

Exposure at 30 cm. (1 ft.) from 8" x 10" Wratten Safelight Lamp Containing 25 W. Bulb.

| Safelight. | Relative Fog Density Produced by 10 seconds Exposure. Panchromatic Film. | Motion Picture Negative Film. |
|---|---|---|
| Series 00 | 2.2 | 1.9 |
| " 0 | 2.0 | 1.2 |
| " 1 | 1.5 | Fog in 1 minute |
| " 2 | 1.5 | Fog in 2 minutes |
| " 3 | 0.2 | Fog in 15 seconds |
| " 4 | 1.0 | 0.8 |

From Table I it is evident that sufficient light cannot be used with panchromatic film without desensitizing

(Continued on Page 18)

# A Mid-Year Cinematographic Review

President *of* A. S. C. Writes *on* Important Advances *During* Last Twelve Months

By **Daniel B. Clarke** A.S.C.

Takes Stock *of* Progressive Steps *since* Last 'Directors' Number' *of* Film Daily

*(The following story was written by Daniel B. Clark, president of the American Society of Cinematographers, for the "Directors' Number" of the Film Daily.)*

It is an unusual twelvemonth indeed that does not bring about an abundant measure of progress in the world of cinematography. Such progress is stimulated not only by the interest of the cinematographer himself in his work, but is substantially brought about by the wishes and demands of the director who is an exponent of things progressive in the field of motion photography.

### *Director's Encouragement*

A director may want a new bit of treatment, either for a novel result or for the same result produced in a different fashion, and it remains for the cinematographer to fill the order. Thus have many improvements been introduced in cinematography.

The year that has passed since the appearance of the last "Directors' Number" of the Film Daily has contributed its share toward the general photographic advancement of the industry, records of the American Society of Cinematographers show.

### *Small Cameras*

Unusual activity has been manifested in the matter of small motion picture cameras of the "amateur" variety. While these instruments have been designed primarily for the wide usage of the novice, they have found their way to the professional motion picture studios. Naturally, the small cameras which do not use the standard size of film are not so adaptable for professional use where the standard negative is imperative. But a portable camera such as the "Eyemo," which is a development of the Bell and Howell company, has been widely adopted for use among recognized cinematographers. Where heretofore, on some precipitous location or in exceedingly close quarters, the director had to forego his desire for an intimate shot of the action because of the size of the regular professional camera, the cinematographer now utilizes his small portable camera with results that are the joy of all concerned.

### *A. S. C. Member's Invention*

Another development which is meeting with marked interest among cinematographers is the invention of John W. Boyle, a member of the American Society of Cinematographers. Mr. Boyle has created an adapter whereby a regular standard camera head may be mounted, in a vertical tandem position, atop a camera of the Akeley type, the two being operated at the same time. The arrangement makes possible a "close-up" and "long-shot" of the same subject of action—a matter which has intrigued the film production imagination for some time.

### *"Talking" Films*

Since the Edison days in motion pictures, "talking" films have commanded perennial attention. Aside from the continuation of experiments on the already acknowledged species of cinema in this line, the Triergon method was announced during the past year in this country, preceded, according to the statistics which were cited, by more or less exhaustive trial exhibitions in Germany. The most recent contribution to this subject is the activity of Warner Brothers. E. B. Du Par, a member of the A. S. C. and a cinematographer on the staff of the Warner studios, is at present in the East working on the latter invention.

The matter of embodying speed into the negative through fast lenses and film has met with steady advancement during the past year. Panchromatic film is more popular than ever, and an "infra-red" stock, treated by Technicolor, has been used for special purposes. The actual taking speed of motion pictures, however, remains at a basis of sixty feet per minute, as re-affirmed by the American Society of Cinematographers and the Society of Motion Picture Engineers.

### *Color*

In the color division of cinematography, Technicolor remains in the van. "The Black Pirate" is generally heralded as the best that has been done by this method. There seems to be little question in Hollywood that a new vista was opened in this work by virtue of the lighting and other methods employed by Henry Sharp, who was chief cinematographer on the Douglas Fairbanks production.

# *Blue, red, yellow, green*

In photographing brilliant costumes, colorful sets, vivid landscapes Eastman Panchromatic Negative enables you to keep *all* colors—blue, red, yellow, green—in their correct relationship in black and white tones.

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## *Another "Scoop" for EYEMO*

### *Hawaiian Volcanic Disaster Filmed*

All the world has read of the outbreak on April 10 of the Volcanic Eruption on the top of Mauna Loa in South Koa, and of the havoc it caused in the village of Hoopuloa which was completely destroyed by the molten lava flow.

Following the eruption word was received that the entire disaster had been "shot" with two EYEMO Standard Automatic Cameras—the only motion pictures taken—and that the films were being shown by the International Newsreel Company on the public screens of the world.

The filming of the Volcanic disaster was a tremendous scoop for the International Newsreel Company—one of the biggest in the history of their business. EYEMO made this scoop possible.

Still another "beat" for EYEMO was the filming of the ill fated "Antinoe" which was shot from the deck of the rescue ship President Roosevelt by an EYEMO Cinematographer.

## *Many Famous Expeditions Equipped with EYEMO*

*Below are some of the many famous expeditions now using the EYEMO Standard Automatic Camera:*

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Byrd Polar Expedition
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Bering Sea Expedition
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Smithsonian-Chrysler Expedition to Africa
Wilkins North Pole Expedition—with Mr. Rossman
United States Dept. of Interior, Geological Survey (Alaskan)
African and Mongolian Expedition of the American Museum of Natural History

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*Byrd*

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*Dirigible Norge Equipped with Two EYEMO Cameras.*

*Amundsen*

### *EYEMO Visits the Pole with Byrd and Amundsen*

When Lt. Com. Byrd, who guided the now famous airplane "Josephine Ford," left on his trip to circle the North Pole, he carried with him an EYEMO Standard Automatic Motion Picture Camera. He appreciated that a *motion picture* record was necessary to make the trip complete.

And now comes the word that Amundsen of the Amundsen and Ellsworth Polar Expedition, who closely followed Byrd, took along *two* of these standard automatic cameras. Tremendous scoops for EYEMO!

### *Chosen Because of Its Compactness*

Both of these famous expeditions knew the advantages of compactness in a motion picture camera for the trip. So they chose EYEMO—the light weight, quick and ready standard film camera designed particularly for field and stunt use. Flexibility was another requirement. With EYEMO they had the photographic flexibility of a professional Bell & Howell Studio Model. And the camera had to be *dependable* for such an important trip. EYEMO'S dependability, they considered, was established by the 19-year reputation for quality of the company building and backing it.

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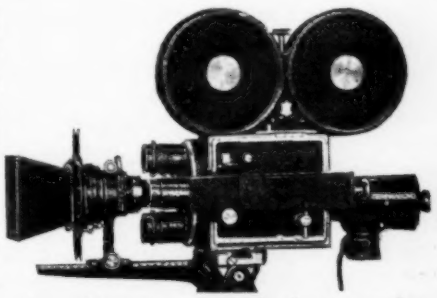

*The Pioneer, and The Standard by which all others are compared.*

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# "Trick" Photography Methods Summarized

(Continued from Page 9)

spot light photographed through a copper wire screen to give the shimmering rays which are shown in the conventional paintings representing this sacred history. The massive walls of Fort Schuyler furnished the walls of the City of Jerusalem and the Wise Men followed the Star on the backs of camels in the Bronx Zoo. Photographs of the pyramids were double exposed above a location on a sandy beach for the sojourn in Egypt and the pillared portico of a rich patent medicine manufacturers' home served as the architecture of the Roman Court.

*Great Demand*

Nearly seven hundred prints from the original and two dupe negatives which had to be made to supply the demand were sold and some of the prints are still listed by educational exchanges. Orders were still coming in when the negatives were destroyed in a disastrous studio fire.

*What Comedies Brought*

Since the days of these crude pictures trick photography has waned and then waxed strong again. For a long time it was the step child of the legitimate producers. The comedy producers, however, have always regarded it as one of their strongest allies. It is, in fact, mainly due to the patient research of serious workers on the slap-stick lots that the credit for the present perfection of trick effects is largely due.

*Experts*

Far sighted producers have awakened to the money savings that may be affected by the use of trick photography and now all the larger companies retain the services of high salaried experts who are specialists in the business of artistic photographic trickery.

*Stringent Requirements*

Trick photography is a trick profession. It requires the arts of a trained magician with the added requirement that the spectator shall not even suspect that he is being deluded. Magicians must be familiar with psychology, with intricate mechanics, with higher mathematics, with physics, with art, with myriads of complicated details that must be made to dovetail to the fraction of a second. The craft of the trick cinematographer is just as exacting and calls for an even wider application of special and practical knowledge.

It is not my intention to give in this paper any detailed explanation of trick photography. The subject is far too broad to be covered, even in a large volume. Every piece of trick photography is a separate problem and, just as the combinations of the alphabet are practically infinite, so are the various combinations that may be arranged in doing work of this character.

Trick photography in cinematography is an analysis of motion in two or more directions. Simple cine analysis of motion is the series of frames or pictures the successive units of which represent phases of action at intervals of one sixteenth of a second. Most cine tricks require that two or more of these analyses be synchronized on one film and at the same time matched or blended with one another so that the line of demacration between the two or more combinations be imperceptible to the eye even after the image is enlarged several thousand times on the theater screen.

In cases where the recording or taking interval of

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the combined components is the customary sixteen per second in each case, then the combination is not such a complicated problem as the written explanation makes it appear to be. It is very intricate, however, when the component members of the combination have to be taken at different rates of speed. In "The Lost World" there were many scenes where the taking of the action of the prehistoric monsters required weeks and months of exposures made at comparatively long and irregular intervals. These stop motion exposures had to be synchronized and combined with the action of human characters whose movements, photographed at regular speed, occurred in a few seconds so that the composite result appeared to be simultaneous action. Not only was it necessary to synchronize the action but it was also necessary to reverse the apparent size of the objects so that the monsters, which were in reality miniature figures, seemed to be gigantic in comparison to the human actors.

*Results*

Trick photography thus does two tremendously important things for the industry; it renders possible the use of scenes and effects hitherto impossible of presentation and reduces enormously the cost of building elaborate sets. It also seems safe to prophesy that in the near future it will also eliminate the necessity for many exterior locations; particularly those to distant points where time and transportation are a large factor in production expense.

Let me outline roughly into a sort of general classification the various methods by which the trick photographer builds up his effects:

*Basis*

*First,* we have the basic standard of straight cinematography which consists of a series of frames or pictures taken at the approximate speed of sixteen exposures per second.

*High Speed, Slow Motion*

*Second,* high speed or slow motion photography in which the taking rate is considerably increased. For the laws governing the taking of miniatures by high speed photography to stimulate action in the tempo of natural sized objects I refer you to the very excellent paper by J. A. Ball, entitled "Theory of Mechanical Miniatures in Cinematography," presented before the Society of Motion Picture Engineers at Roscoe, New York, May, 1924, and published in the Transactions of the Society.

*Varied Taking Speeds*

*Third,* time condensation or decreasing the taking speed to such an extent that movements which take place slowly and over so long a period of time as to be imperceptible to the human eye are made to appear to occur in a few seconds. This method is commonly used for showing the growth of plants, the germination of seeds, the erection or demolition of structures, etc. Slow cranking at slightly diminished speed is used to increase the speed of actors movements for comedy effects and to speed up action in fights, races, and dramatic climaxes.

*Animated*

*Fourth,* trick crank or one picture turn. This is closely related to time condensation. The trick crank shaft is the one usually used for making time condensation exposures. The name "trick crank" comes down from the early days of cinematography because the single exposure shaft was often employed in making many of

(Continued on Page 20)

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# DESENSITIZERS

(Continued from Page 11)

to inspect it satisfactorily during development, even though the sensitivity may be slightly decreased when wet with developer. Motion picture negative film, on the other hand can be inspected quite freely with a red light such as is given by the Series 1 safelight.

*2. Desensitizing.*

*A. Purpose of a Desensitizer.*

A photographic desensitizer is a substance which has the property of greatly diminishing the sensitivity of a photographic emulsion toward light action. To be of practical use in development it must not affect a latent image already present nor interfere with its subsequent development.

The most important reasons for using a desensitizer are: (a) to permit the inspection of panchromatic film during development, (b) to give much greater freedom in the use of safelights during the development of ordinary film, and (c) to prevent serial or oxidation fog.

In a previous communication[3] it has been shown that the presence of a desensitizer in a concentration of 1-500,000 or even 1-1,000,000 in a developer which has a tendency to produce aerial fog, is sufficient to prevent such fogging action. This is of considerable value in the machine development of motion picture film, and for such use it has been found possible, by adding one part in a hundred thousand of phenosafranine, to use a dilute elon-hydroquinone developer with much less sulphite than would otherwise be necessary.

It has been stated in the literature [4] that in some cases a desensitizer also diminishes ordinary development or tank fog. This effect may be a decreased oxidation fog within the developer, but with certain developers tank fog is apparently diminished. This is discussed more fully in another section.

In the present paper it is proposed to show the extent to which the use of a typical desensitizer will permit greater safelight illumniation during development.

*B. Methods of Use.*

Densensitizing dyes are used either as a preliminary bath or in the developer itself. As a preliminary bath a concentration of 1-5000 or 1-10,000 is commonly used, and the film is dipped in the desensitizing solution for one or two minutes just previous to development. This operation must, of course, be carried out with proper safelights or in the dark.

When used in the developer the concentration usually recommended is 1-25,000 or less and the film is left in the developer for one or two minutes before exposing it to a safelight stronger than usual. In most cases the same concentration of dye desensitizes much more powerfully in the developer than in a separate water solution.[5]

*C. Considerations in Selecting a Desensitizer.*

Many dyes and other substances are known which greatly reduce the sensitivity of emulsions. However, in finding a substance suitable for practical use there are many factors involved, the most important of which will be considered briefly.

3. Merle L. Dundon and J. I. Crabtree, "Investigations on Photographic Developers, II, The Fogging Properties of Developers," Amer. Phot. **18**, 742, (1924), Rev. Franc. Phot. **5**, 320, (1924), Sci. Ind. Phot. **5**, 1, (1925), B. J. Phot. **71**, 701, 719, (1924).

4. A. E. Amor, "The Prevention of Tank Fog," B. J. Phot. **72**, 183, (1925).

*1. Desensitizing Power.*

Desensitizing power is, of course,the first consideration. With desensitizers now known the speed of an ordinary fast emulsion to white light can be reduced several hundred times, while the decrease in sensitivity of panchromatic emulsions to certain safelights may reach several thousand times. Different desensitizers vary considerably in their ability to decrease the relative color sensitivity of panchromatic materials, and this variation also depends on the particular dyes used to give color sensitiveness to the emulsion.

*2. Effect on the Latent Image.*

To be of practical use a desensitizer must not remove to any extent a latent image already present on a film within a reasonable length of time. Most desensitizing dyes will destroy a latent image if the desensitized film is exposed to strong red light, and Carroll[6] has reported that pinakryptol green will destroy a latent light image even in the dark if allowed to stand several hours before development. This fact has been confirmed in this investigation.

*3. Effect on Development.*

Desensitizing dyes generally decrease the induction period of certain developing agents such as hydroquinone and pyro and so may change the Watkins factor of a developer. Some desensitizers retard development. It is, of course, desirable that the addition of a desensitizer shall not affect the time of development nor change the shape of the characteristic curve of the developed image.

*4. Fogging Action.*

Some of the most powerful desensitizing substances known, such as methylene blue, have an independent fogging action which entirely prevents their use for this purpose. No appreciable fogging action can be tolerated, although certain commercial desensitizers have a slight tendency in this direction.

*5. Staining Action.*

Some of the desensitizers in use stain not only the gelatin of the film and the trays in a very disagreeable manner, but also the fingers of the person who uses them. The stain is most persistent in the hardened gelatin on the back of a non-curling film. A desensitizer which does not stain gelatin or which washes out very easily is desirable.

The color or absorption region of the stain produced is also of importance because if it does not transmit blue light the printing time of a stained negative may be affected.

*6. Color in Relation to Safelight.*

If desensitized films are to be inspected by transmitted light during development the color of the desensitizer with which a film is stained must be such that it does not absorb the light transmitted by the safelight. Otherwise the whole film will appear fogged or too dense to examine satisfactorily. For instance, phenosafranine appears black in a green light and colorless in a red light.

*7. Solubility in a Developer.*

The concentration in which desensitizers can be added to a developer is often limited by the fact that they form an insoluble precipitate with certain developing agents, especially hydroquinone. In extreme cases a precipitate may form in an emulsion when it is put into a developer after a preliminary desensitizing bath.

5. A. Huble, "Contributions to Development in Bright Light," Phot. Rund. **62**, 114, (1925).

6. B. H. Carroll, "Solarization and Photographic Reversal to Desensitizers," J. Phys. Chem. **29**, 693, (1925).

*Stability.*

Some desensitizers which are very effective as a preliminary bath are destroyed immediately by the sulphite, if added to a developer. The stability in a developer and the keeping property of the water solution when exposed to light and air are important factors.

*Speed of Action.*

Especially when a desensitizer is used in a developer the speed ofthe desensitization is important. Luppo-Cramer[7] has pointed out that while Rhoduline Red G is as strong a desensitizer as phenosafranine it takes twice as long to produce the same effect. This is probably due to a slower rate of diffusion through the gelatine.

*Availability and Cost.*

For general use it is obvious that a substance must be available at a reasonable price.

## III. Comparative Properties of Different Commercial Desensitizers

*Phenosafranine.*

The first important member of this series is phenosafranine of which the desensitizing action was discovered by Luppo-Cramer and is described fully in his book on the Safranine Process.[8]

Many of the safranine dyes have a similar desensitizing action, but considering all its properties Luppo-Cramer considered phenosafranine to be the most generally useful of those which he examined. Phenosafranine has a strong desensitizing action, does not give trouble from fog, and is a well known and easily obtainable substance. It is perfectly transparent in a bright red light but has a dark appearance in a green light. It is less effective in desensitizing panchromatic materials such as Eastman Commercial Panchromatic Film than is pinakryptol green. When used with an ordinary plate such as Eastman 40 it extends the spectral sensitivity through the green giving a maximum at 580 mm. Phenosafranine forms a precipitate in developers containing hydroquinone to about the same extent as does pinakryptol green but if added with care can be used in most elon-hydroquinone developers. In pyro developers it is distinctly less soluble than is pinakryptol green.

The most serious objection to the use of phenosafranine is the intense stain which it imparts to the film, trays, and hands. When a film is thoroughly fixed in an acid fixing bath most of the dye washes out quite readily. However, any residual stain left in a negative has no effect on its printing time as phenosafranine transmits the violet light to which positive emulsions are most sensitive. When used in small concentrations to prevent aerial fog its staining action is not appreciable.

In Fig. 3 is shown the absorption spectrum of phenosafranine, in relation to that of pinakryptol green and basic scarlet N.

*Pinasafrol.*

Pinasafrol is stated by Wall[9] to be safranine J IV or tetra methyl safranine. It is said to be a slightly stronger desensitizer[8, 10, 11] than phenosafranine but was stated by Luppo-Cramer to be less desirable for prac-

(Continued on Page 23)

7. Luppo-Cramer, "Protective Dyes in Desensitizing," Phot. Ind. p. 187, 1925.

8. Luppo-Cramer, "Negative Development by Bright Light, The Safranine Process" 2nd Edition, Leipzig, 1922.

9. E. J. Wall, "History of Three Color Photography," Boston, 1925, p. 300. This book also contains a very complete bibliography on desensitizing.

10. Luppo-Cramer, "The Best Desensitizer," Phot. Ind., 1925, p. 1356.


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(Continued from Page 17)

the trick effects mentioned in the first paragraphs of this paper.

Animated cartoons and diagrams are made by means of the trick crank and are, of course, trick photography. Nevertheless, in cine nomenclature animated diagrams and cartoons are a classification separate from that of trick photography and, while most of the devices used by the animated cartoonist are also used in trick photography, the subject is too large to be treated in this paper. To those interested in the subject I refer them to the very able volume by E. G. Lutz, entitled "Animated Cartoons," published by Scribners.

The difference in time condensation and trick crank work is in the interval of the timing. In time condensation the interval is predetermined by the length of time in which it is expedient to show the resulting film. In trick crank work the successive phases of movement are artificially produced between exposure intervals so that inanimate objects may appear to be endowed with automotive powers. The time of exposure interval is therefore dependent on the time necessary to arrange the subjects into the successive phases of the simulated action.

Every move of every joint and limb of the prehistoric animals in "The Lost World" had to be thought out beforehand and a calculation of the amount of movement which would occur in each succeeding phase of one sixteenth of a second if the model were an actual animal with the bulk of several elephants.

*Reverse Order*

*Fifth,* reverse camera, or the showing of the series pictures of a motion analysis in reverse order. The effects produced by this method are too well known to describe them.

*Mattes*

*Sixth,* simple devices or attachments used mainly to alter the size and shape of the screen opening. These consist of masks or mattes of opaque or translucent material which either vignette the edges of the picture or produce silhouetted openings to enhance the illusion of scenes which are supposed to be observed through an archway, a keyhole, a telescope, binoculars or other familiar orifice. Previous papers presented before the Society describe these devices in detail.

*Stop Motion*

*Seventh,* stop camera and substitute which is one of the oldest and most familiar of trick devices. It was and is used mainly for magic appearances and disappearances. It consists in stopping the action and camera simultaneously and placing or removing the objects which are to appear or disappear.

*Eighth,* the fade and dissolve. This is similar to stop camera but is a gradual instead of an abrupt change. It is produced by diminishing the exposure to zero and then running the film back to the commencement of the reduced exposure and fading in or increasing the second exposure at the rate as the previous one was reduced, thus giving full exposure to objects which remained in the scene during the fade in and out, but gradually introducing or extinguishing the image undergoing the magical change.

*Multiple Exposure*

*Ninth,* double or multiple exposure. By this device dual roles can be played by a single actor. It consists of masking off a portion of the picture frame and making one exposure, then winding the film back to the beginning


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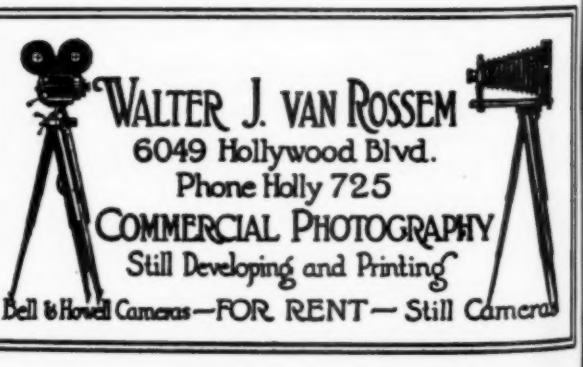

and masking the first exposure while the second one is made on the remaining unexposed portion of the frame. The frame may be divided in this manner as many times as is necessary to produce the effects desired. I have made multiple exposures where the film was run through the camera twenty-six times. Dual roles, visions and ghostly apparitions are produced by this method. Masks are not usually used for ghost effects. The first exposure without the ghost is made in the normal manner and the ghost, dressed in light colored clothing, is exposed over the first record by posing the ghost actor against a black drop or shadow box. The details of the first exposure register through the shadows of the ghost outline and give it the shadowy or spiritual quality which ghosts are supposed to possess. The chief difficulties in double exposure work are in the synchronization of action and the matching or blending of the edges of the masked sections so that the line of demarcation is indistinguishable.

### *Glass*

*Tenth,* glass work, which is a variety of simultaneous double exposure. The term "glass work" originated because the first examples of this work were accomplished by painting portions of scenes on large sheets of plate glass. A piece of plate glass a little larger than the field of view of the lens at 10 or 12 feet from the camera is placed in a rigid frame parallel to the front of the camera. The field of action as viewed by the camera lens is left clear and no pointing is done on this portion of the glass. Any section of the remaining portion of the picture composition, however, can be masked out and replaced by a painting, in accordance with the laws of perspective, of any kind of background or foreground that the production may require. With the use of this device it is necessary to build only such portions of a set as is required to form a background for the action while the remaining portion is supplied by the painting on the glass.

The ordinary two-inch cine objective lens at distances beyond ten feet is almost universal in focus; this brings the entire picture in focus and does not blur the painting even though it is close to the lens and the set it far away.

By use of miniature models built to scale almost any number of different setups may be made, but extreme care must be used in lining up the model with the actual set which it completes. In the "Hunchback of Notre Dame" the picture shows a full size reproduction of the Cathedral of Notre Dame in Paris and yet the actual construction of the set was only to the top of the entrance doors, the upper portion being supplied with glass work and miniature models.

### *Mirrors and Prisms*

*Eleventh,* simultaneous double exposure by means of mirrors and prisms. This is a reversal of the means by which two identical images are made with one lens in the color cameras. By this reversal two images may be superimposed and photographed on the same frame simultaneously and as the two images may be independently focused much smaller models and paintings may be utilized than in the glass work process. It is even possible to use a motion picture, previously taken, for the background of the new composite, so that actors in the studio may be shown amid the waving palms of a background photographed in the Sahara desert. This method has lately been heralded as a wonderful German invention under the name of the Schuefftan process but is antedated by

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several American users, among whom are David Horsely, J. Searle Dawley and myself.

*Double Printing*

*Twelfth*, double printing, which consists of making a composite negative by duping from two or more specially prepared positives and masking devices, or in making a special positive from two or more negatives and then duping the result. This corresponds in principle to multiple exposure in the camera. It is usually used to superimpose dark images on high lighted areas, a thing which is difficult to do in the camera.

*Traveling Matte*

*Thirteenth*, the traveling matte. By this process figures in action may be superimposed against any background without being necessary to build any sets at all. It requires very accurate mechanism to work it and is patented. It is sometimes called the Williams process from the name of the patentee, Frank Williams. It consists in photographing the action against a white background. By over exposure and intensification a silhouette of the action forms a mask or traveling matte which is interposed between the printing light and the background negative while a print is made from it. This positive film is then run through the printing machine a second time in register with the action negative, thus printing in the details of the acting figures. From this double print a dupe negative is made for further printing. The silhouette print masks the places occupied by the action figures and the original action negative has a dense black ground which masks the background negative image when making the master positive.

*Projection Printing*

*Fourteenth*. Projection printing with separate positive and negative control. In this process the printing is not done by contact as in the ordinary printing machine but by projecting the image from the negative onto the positive. The movement of the negative and positive films is controlled by separate mechanisms so that by manipulation of the controls any combination of the negative action series can be recorded in consecutive order on the positive film. The action on the original negative can thus be stopped, accelerated, retarded or reversed on the positive and by multiple masking and printing several successive phases of action of the same moving figure may be shown on the screen simultaneously. Max Fleischer and Alvin Knechtal are exponents of this process.

*Other Method*

*Fifteenth*. Mechanical devices operated independently and not connected mechanically with the operation of photography or printing have not been considered as coming within the province of this paper. They are too numerous to even attempt their listing. It should be said in this connection, however, that the trick photographer leaves no stone unturned in seeking to produce the desired effect and any device which lends itself to his use is considered his legitimate ally.

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# PROJECTION

(Continued from Page 8)

mechanical aptitude, a high degree of technical knowledge and a certain inherent talent for projection, itself. A projectionist may have a high degree of mechanical skill, he may be an expert electrician, he may have the basic knowledge of physics necessary for the intelligent solution of his many current and recurrent technical problems, he may be furnished with the best projection equipment that money can purchase, the conditions under which he is working may be perfect for expert screen results and, yet, unless he possesses a peculiar and intangible aptitude for the art of projection, itself, his results on the screen may be colorless and commonplace despite their theoretical perfection.

*Personality in Projection*

I have often challenged the statement that the personality of the projectionist cannot be built into his projection. It absolutely can be, providing he possesses the ability to do it. I do not mean to say that we can go into a theatre employing two shifts of projectionists and determine by casual observation of the screen which projectionist is on duty at the time. What I do mean is that if a projectionist of ability and skill and with a natural aptitude for the art is in charge of, or has supervision over, the projection room and is endowed with the faculty for developing the latent talent in his subordinates, then he can just as definitely build his personality into the picture as the musical director can build his into the orchestra.

*Intelligence Necessary*

This illustrates the importance of the personal equation in the projection room, the value of which has seemingly been generally underestimated by all except the most astute managers. Expert projectionists and supervisors of projection can not be turned out by any rule of thumb, laboratory, class room nor yet alone by practical experience in the field, itself. Of course, the basis of the qualifications for the expert projectionist is intelligence, and it is a sad commentary on things in general and projection in particular that conditions have been permitted to exist which have tended to greatly discourage the really intelligent man from entering this craft as a means of livelihood. Projection, in a short

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*Manufacturers Aid*

Projector and lens manufacturers are now in a position to supply the projectionist with equipment which will enable him to get the utmost out of the present two-dimension picture. More important, still, the exhibitor is beginning to realize the necessity for expensive projection equipment and high grade lenses and is willing to buy them. A great step forward has been made by several exchanges in their method of checking the condition of their film, thus assuring that prints delivered to the projectionist are in proper condition for projection. The work of the Paramount exchanges along these lines has been especially notable and deserves the hearty appreciation of the industry as a whole. The effects of this work will be far reaching.

*The Future*

These, and many other things, are indications of the change that is taking place in the standard of projection as practiced in this country. The possibilities in this field are now attracting the favorable attention of the college trained man, and unless the average projectionist now employed in this work lays out for himself, and adheres to, an immediate and intensive course of study and application along technical lines, he will awake some day to discover that the whole structure of the craft has changed over night and that he is still living in the yesterday.

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(Continued from Page 19)

tical use because it is not transparent in a red safelight. It has not been tested in this laboratory.

*3. Pinakryptol Green.*

Pinakryptol green has about the same general desensitizing power as phenosafranine but is more effective with panchromatic emulsions. It has no effect on the latent image when used immediately before, or during development, and does not affect the keeping properties of a developer.

It has a slight but distinct fogging action, however, and if used for too long a time or in too high a concentration as a preliminary bath undesirable fog may be produced. As ordinarily used this is not serious. The chief advantage of pinakryptol green is the fact that it does not tend to stain gelatin and so washes out of the emulsions very easily. It is colorless in a yellowish green light and so can be used very advantageously to develop panchromatic films withthe Series 4 Wratten Safelight. The

## Cameras Go Over the Top

Three cameras in tandem, so to speak, were used by E. B. Du Par, A. S. C., during the filming of the night battle scenes showing a section of the German and English front line trenches for the Warner Bros. production of "The Better 'Ole," starring Syd Chaplin and directed by Charles "Chuck" Reisner, on the Vitagraph lot in Hollywood.

These cameras were mounted at intervals of about ten feet on the three stories of a forty foot parallel. Director Charles "Chuck" Reisner was on the top level equipped with a telephone connected with a Western Electric Public Address System of a dozen units scattered at strategic points over the five acres of trenches, barbed wire, and mud.

Thirty sun-arcs, forty side arcs, and ten rotary spots furnished the illumination. These were grouped around the field, four of the most powerful being placed on fifty and seventy-five foot parallels on either side of the camera. This equipment was powered by four gas and one power generator. Four wind machines kept the field reasonably free of smoke from the explosions.

tendency to form a precipitate with hydroquinone in alkaline solutions limits the concentration that can be added to a strong hydroquinone developer, but with ordinary elon-hydroquinone or pyro developers it can be used satisfactorily.

Pinakryptol green is much more expensive than phenosafranine at the present time. Its composition has not been published although the general structure of the class of dyes to which it probably belongs was recently described by Homolka.[12]

*4. Pinakryptol Yellow.*

Pinakryptol yellow desensitizes more powerfully than pinakryptol green in the same concentration, and can be used much stronger because of its colorless, non-staining solution. Also it is much more active in destroying the color sensitivity of a panchromatic emulsion. When tested with Eastman Commercial panchromatic film and an elon-hydroquinone tank developer it was found to have no effect on the latent image or its subsequent development. It cannot be added to a developer, however, as it is destroyed by sulphite, and some other desensitizer must be used in the developer to prevent the film from regaining its sensitivity during development. A solution of pinakryptol yellow is also said to be slowly decomposed by exposure to light.[13]. It differs from other common desensitizers in that it greatly retards the direct photochemical blackening of an emulsion such as developing paper. As a preliminary bath for desensitizing panchromatic film, it is the most effective of all the desensitizers considered in this investigation.

*5. Pinakryptol.*

Pinakryptol which was on the market before pinakryptol green, consists, according to Luppo-Cramer,[14] of a mixture of pinakryptol yellow and pinakryptol green.

*6. Basic Scarlet N.*

Basic scarlet N was proposed as an effective desensitizer by the Laboratory of Pathe Cinema .[15] It is apparently a mixture of safranine and auramine.[16] Hubl[17] states that it is less effective in desensitizing panchromatic emulsions than pinakryptol green and that its desensitizing power in a developer is no greater than in water solution. Tests in this laboratory have shown that it offers no advantage over phenosafranine in desensitizing

11. Stammreich and Thuring, Zeit. Wiss. Phot. **23**, 363 (1925).
12. B. Homolka, "New Desensitizing Dyes," Phot. Ind., 1923, p. 347.
13. A. Hubl, "Contribution to the Knowledge of Desensitizers," Phot. Rund. **62**, 71, (1925).
14. Luppo-Cramer, "The Origin of Pinakryptol Green and Other Dyes," Phot. Ind. 1924, p. 1194.
15. Research Laboratory of Pathe Cinema, "New Desensitizers," Le Phot. 11, 296, 1924.
16. Lumiere and Seyewetz, "Constitution of Desensitizing Azine Dyes," B. J. Phot. **72**, 446, (1925).
17. A. Hubl, "Basic Scarlet N as a Desensitizer," Phot. Ind. 1925, p. 432.

wer, that it is no more soluble in hydroquinone or yro developers, and that the persistency of the stain is out the same. As is indicated by its absorption spectra, ig. 3, its stain has a greater tendency to retard printing han phenosafranine stain, but in the amount present in n ordinary fixed and washed negative such an effect is nappreciable.

*Aurantia.*

Aurantia has been recommended by Lumiere and eyewetz[18] especially for use with Autochrome plates. ts desensitizing power is far less than that of phenosafranine, it stains badly, and washes out slowly. Unlike ost other desensitizers it can be added to a concentraion as much as 1-500 without precipitating and for this eason may have some use in special cases.

*Miscellaneous Dyes.*

A large number of dyes are known[18, 19, 20] which esensitize photographic emulsions but which are not ractically useful because they produce some undesirable ffect such as fog, stain, destruction of the latent image, r retardation of development. Notable among such subtances is methylene blue which is a more powerful desensitizer than pinakryptol green, but which fogs[21] very adly. It has been stated [15] that methylene blue can be sed in connection with another dye such as acoridine yelow which retards the fogging action and still permits esensitizing. Other combinations suggested are rholuine blue or rholuline violet with acridine yellow. The ethylene blue-acridine yellow mixture was tested and ound to desensitize well without serious fog when carefully used. However, it has no advantage over other ommon desensitizers, as Luppo-Cramer[7] has also shown, nd a mixture is certainly less desirable than a homogeneous substance.

Pinakryptol green was selected for studying the imits of safety in the use of a typical desensitizer because t appeared to be the most satisfactory in all respects of ny desensitizer available at the time of this investigation.

## IV. Methods Used for Testing Desensitizing Action

*Tablet Exposures.*

A step tablet was prepared which had 25 steps covering a density range from 0.14 to 3.40. Over this were laced narrow strips of the dyed gelatin filters corresponding to the Wratten safelights Series 00, 0, 1, 2, and 3. The strip on which white light measurements were made was covered with a neutral density of 2.30 in order to bring the exposure within the same range as those through the safelight filters.

Tests were made by soaking a strip of film in the solution to be tested, removing excess liquid by drawing it quickly across a piece of chamois stretched over a bottle, and exposing while wet through the tablet. Exposures were made in a cabinet lined with black cloth 50 cm. from a 200 W. tungsten lamp which had a candle power of 176 as used. Exposures for desensitized film were 5 minutes and for untreated film 10 seconds. The strips were developed for 10 minutes in an elon-hydroquinone tank developer[22] (NQ-80 tank), fixed, and washed.

From the last visible step on each strip relative exposure values necessary to produce a visible density were calculated. Comparison with the value for untreated film showed the relative sensitiveness for each treatment. With one exposure through the tablet, values could be obtained for white light and for each of the safelights mentioned above. By this method the measurements were made on an intensity scale instead of a time scale. The values obtained were subject to an error at least equal to the difference in exposure represented by one step on the tablet, which would be about 50%. Considering the enormous range in sensitivity covered, a difference of 100% would not be serious, however, as this would only mean that a film might have, for example, either 0.1% or 0.2% of its original speed. For practical use a margin of safety much greater than this should be allowed.

*Direct Exposure to Safelights.*

In order to relate the results of the tablet exposure to practical darkroom conditions, the time required to fog desensitized film when exposed directly to the safelights was determined. Strips of film 10 cm. x 25 cm. (4"x10") were dipped by stages into a desensitizing bath so that the different areas were in the solution 5, 3, 2, 1, and ½ minutes with an untreated portion left on the end. The strip was then wiped with a chamois, placed under the safelight to be tested, and an opaque slide moved across it in such a way that each of the above areas were exposed

18. A. and L. Lumiere and A. Seyewetz, "Experiments on Desensitizers," B. J. Phot. **68**, 351 and 370, (1921).

19. E. Stenger and Hans Stammreich, "Contribution to the Knowledge of Desensitizing Silver Bromide-Gelatin Emulsion." Zeit. wiss. Phot. **23**, 11, (1924).

20. J. G. F. Druce, "Notes on the Action of Desensitizers in Photographic Development," Science News, Nov. 1924, p. 2.

21. J. Eggert and J Reitstotter, "The Photographic Effect of Methylene Blue as an Adsorption Effect," Kolloid Zeit. 36, 298, (1925).

22. J. I. Crabtree, "The Development of Motion Picture Film by the Reel and Tank System," Trans. Soc. M. P. Eng. **16**, 163, (1923).


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8, 4, 2, 1, and ½ minutes. The exposure was made at a distance of 30 cm. (1 ft.) from a Wratten Safelight lamp fitted with a 25 W. bulb. The values for the illumination in foot candles afforded by the different safelights under these conditions are given in Fig. 1. From these strips after development, the longest time of exposure which did not cause visible fog for each time of bathing could be determined.

*3. Exhaustion Tests.*

For the keeping and exhaustion tests solutions were kept in 2 liter glass battery jars which were deep and narrow and simulated the conditions in a large tank.

### V. The Use of Pinakryptol Green as a Preliminary Bath for Desensitizing Motion Picture Negative and Panchromatic Film

*1. Effect of Concentration and Time of Bathing on Desensitizing.*

Various authors [19] have considered the relation between concentration and desensitizing. As Hubl[13, 23] has suggested, it appears that the amount of desensitizing substance which enters the film layer is the determining factor. Desensitizing is very nearly proportional to the concentration of the desensitizing solution, it increases with rise of temperature, and is diminished by anything which retards swelling such as previously hardening with alum . The temperature coefficient of desensitizing varies with the particular dye used.

The desensitizing action of pinakryptol green was measured by the tablet method described above, for various concentrations and times of bathing. The results for panchromatic film are given in Fig. 4 in which desensitizing is plotted against concentration of the dye. Desensitizing is stated numerically as the ratio of the original to the final speed. For these tests the time of the preliminary bath was 5 minutes. The results show that within the range studied desensitizing is directly proportional to the concentration. The curves for the different safelights have no relation to each other in the sense of absolute safety, but each represents the increased safety due to desensitizing for that particular light.

*(Continued Next Month)*

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C. K. Phillips, well known in the motion picture trade paper advertising field in Hollywood, has joined the staff of the *American Cinematographer* as special representative.

Before joining the staff of this publication, Mr. Phillips worked as advertising representative on the Year Book, the Laemmle number and other special editions of the *Film Daily,* of which Harvey Gausman is west coast manager.

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